

Education Quality and
Accountability Office



GRADE 9 Applied
Assessment of Mathematics
WINTER 2008

Samples of Student Work
Question #7
Field Maintenance

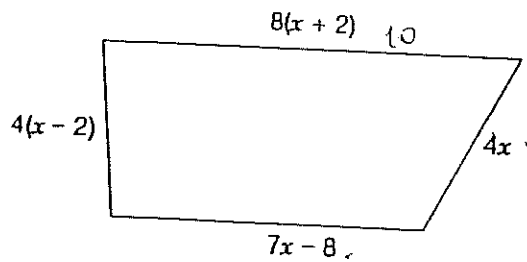
Field Maintenance

Version: 1112x Question 28
 13708 Operational

PN13	Solve first-degree equations with nonfractional coefficients, using a variety of tools (e.g., computer algebra systems, paper and pencil) and strategies (e.g., the balance analogy, algebraic strategies) (Sample problem: Solve $2x + 7 = 6x - 1$ using the balance analogy.)
Code	Descriptor
B	Blank: nothing written or drawn in response to the question
I	<ul style="list-style-type: none"> - Illegible: cannot be read; completely crossed out/erased; not written in English; - Irrelevant content: does not attempt assigned question (e.g., comment on the task, drawings, "?", "!", "I don't know"); - Off topic: no relationship of written work to the question.
10	Application of knowledge and skills to solve first-degree equations shows limited effectiveness due to <ul style="list-style-type: none"> • misunderstanding of concepts; • incorrect selection or misuse of procedures.
20	Application of knowledge and skills to solve first-degree equations shows some effectiveness due to <ul style="list-style-type: none"> • partial understanding of the concepts; • errors and/or omissions in the application of the procedures.
30	Application of knowledge and skills to solve first-degree equations shows considerable effectiveness due to <ul style="list-style-type: none"> • an understanding of most of the concepts; • minor errors and/or omissions in the application of the procedures.
40	Application of knowledge and skills to solve first-degree equations shows a high degree of effectiveness due to <ul style="list-style-type: none"> • a thorough understanding of the concepts; • an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding)

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$460 = 8(x+2) + 4(x-2) + 4x + 7x-8$$

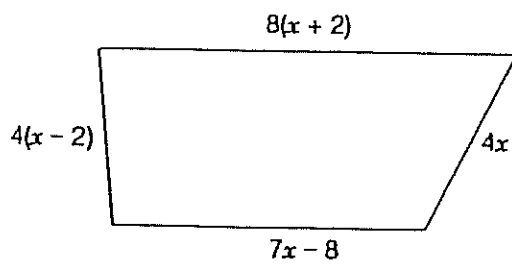
$$460 = 8x + 16 + 4x - 8 + 4x + 7x - 8$$

$$460 = 23x$$

$$x = 460 \div 23 = 20$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$4(x-2) + 8(x+2) + 4x + 7x-8$$

$$12(x-2) + 12(x+2) + 11x-8$$

$$12x-2 + 12x+2 + 11x-8$$

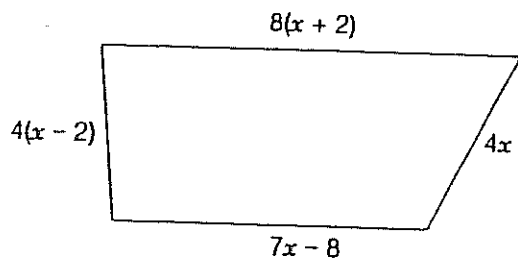
$$12x + 12x - 2 + 2 + 11x - 8$$

$$24x + 11x - 8$$

$$35x - 8$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$8(x+2) + 4(x-2) + 7x-8 + 4x = 360$$

$$8x + 16 + 4x - 8 + 7x - 8 + 4x = 360$$

$$8x + 4x + 7x + 4x = 360 - 16 + 8 + 8$$

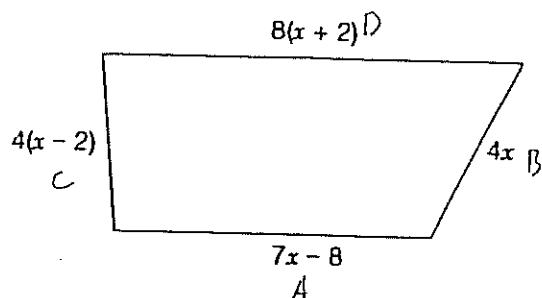
$$23x = 344 + 8 + 8$$

$$\frac{23x}{23} = \frac{360}{23}$$

$$x = 15.7$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$P = A + B + C + D$$

$$460 = 7x - 8 + 4x + 4(x - 2) + 8(x + 2)$$

$$460 = 7x - 8 + 4x + 4x - 8 + 8x + 16$$

$$460 = 7x + 4x + 4x + 8x - 8 - 8 + 16$$

$$\frac{460}{23} = \frac{23x}{23}$$

$$20 = x$$

$$\begin{aligned} A &= 7x - 8 \\ &= 7(20) - 8 \\ &= 140 - 8 \\ &= 132 \text{ m} \end{aligned}$$

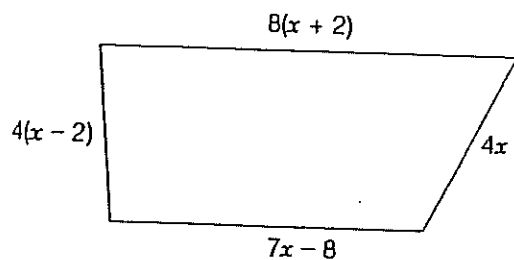
$$\begin{aligned} B &= 4x \\ &= 4(20) \\ &= 80 \text{ m} \end{aligned}$$

$$\begin{aligned} C &= 4(x - 2) \\ &= 4(20 - 2) \\ &= 4(18) \\ &= 72 \text{ m} \end{aligned}$$

$$\begin{aligned} D &= 8(x + 2) \\ &= 8(20 + 2) \\ &= 8(22) \\ &= 176 \text{ m} \end{aligned}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



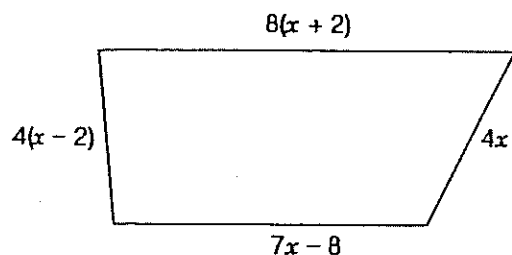
$$\begin{aligned} \text{Perim Trapezoid} &= P = a + b + c + d \\ &= 8(x + 2) + 4x + 4(x - 2) + 7x - 8 \end{aligned}$$

Determine the length of fencing needed for each side of the field.

Show your work.

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$= 8x + 16 + 4x + 7x - 8 + 4x - 8$$

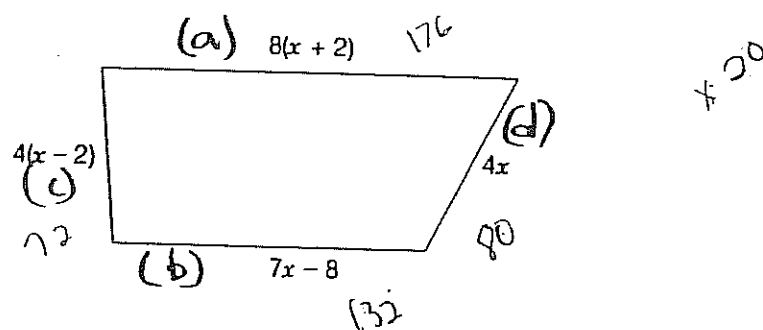
$$= 8x + 4x + 7x + 4x + 16 - 8 - 8$$

$$= 23x$$

$\therefore 23\text{m}$ of fencing is needed for each side of the field.

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

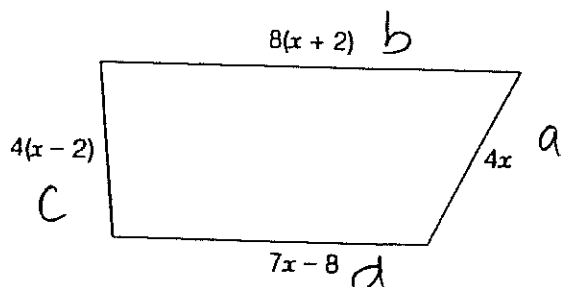
Show your work.

$$x = 20m$$

Side (a) - you would need 176m of fencing
 Side (b) - you would need 132m of fencing
 Side (c) - you would need 72m of fencing
 Side (d) - you would need 80m of fencing

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

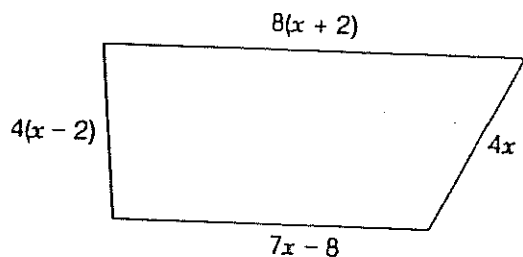
$$\begin{aligned}
 8(x+2) + 4(x-2) + 7x-8 + 4x &= 460\text{m} \\
 = 15 + 4x &= 460\text{m} \\
 15 + 4x - 15 &= 460 - 15 \\
 4x &= 445 \\
 \frac{4x}{4} &= \frac{445}{4} \\
 x &= 111.25
 \end{aligned}$$

$$\begin{aligned}
 a &= 4x \\
 &= 4(111.25) \\
 &= 445\text{ m} \\
 b &= 8(x+2) \\
 &= 8(111.25+2) \\
 &= 8(113.25) \\
 &= 906\text{ m}
 \end{aligned}$$

$$\begin{aligned}
 c &= 4(x-2) \\
 &= 4(111.25-2) \\
 &= 4(109.25) \\
 &= 437\text{ m} \\
 d &= 7x-8 \\
 &= 7(111.25)-8 \\
 &= 770.75\text{ m}
 \end{aligned}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$P = a + b + c + d$$

$$460\text{m} = 4(x - 2) + 8(x - 2) + 4x + 7x - 8$$

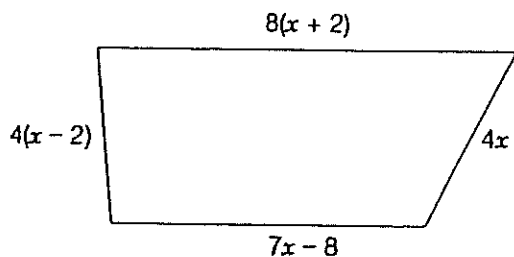
$$460\text{m} = 4x - 8 + 8x - 16 + 4x + 7x - 8$$

$$460\text{m} = 4x + 8x + 4x + 7x - 8 - 16 - 8$$

$$460\text{m} = 23x - (-16)$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



$$\begin{aligned}
 P &= a + b + c + d \\
 P &= 8(x+2) + (7x-8) + 4(x-2) + (4x) \\
 P &= 8x + 2 + 7x - 8 + 4x - 2 + 4x \\
 P &= 8x + 7x + 4x + 4x + 2 - 8 - 2 \\
 P &= 23x - 8
 \end{aligned}$$

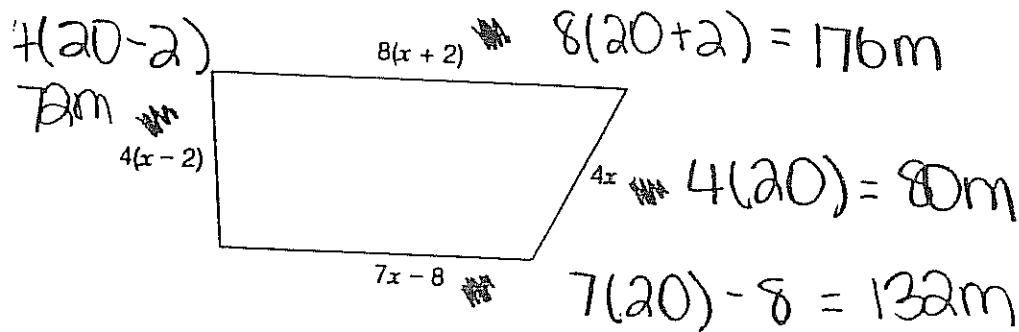
Determine the length of fencing needed for each side of the field.

$$P = 15x$$

Show your work.

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

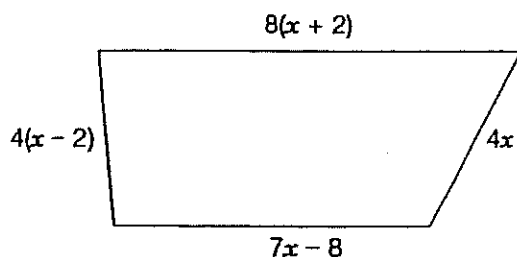
Show your work.

$$\begin{array}{r}
 21 \\
 176\text{m} \\
 \div 80\text{m} \\
 132\text{m} \\
 72\text{m} \\
 \hline
 460\text{m}
 \end{array}$$

$$x = 20$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



$$4x + 7x - 8 + 4(x - 2) + 8(x + 2)$$

$$4x + 7x - 8 + 4x - 8 + 8x + 16$$

Determine the length of fencing needed for each side of the field.

Show your work.

$$8(x+2) + 4(x-2) + 7x - 8 + 4x = 460$$

$$8x + 16 + 4x - 8 + 7x - 8 + 4x = 460$$

$$8x + 4x + 7x + 4x + 16 + 4 - 8 - 8 = 460$$

$$23x + 12 = 460$$

$$23x + 12 - 12 = 460 - 448$$

$$\frac{23x}{23} = \frac{448}{23}$$

$$x = 19\frac{1}{2}$$

$$= 8(x+2) \quad = 4x \quad = 4(x-2)$$

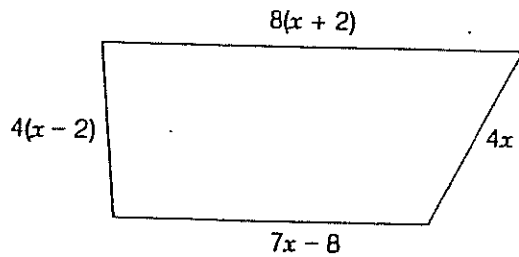
$$= 8(19\frac{1}{2} + 2) \quad = 4(39\frac{1}{2}) \quad = 4$$

$$= 8(21\frac{1}{2}) \quad = 140\frac{1}{2}$$

$$= 168\text{ m}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

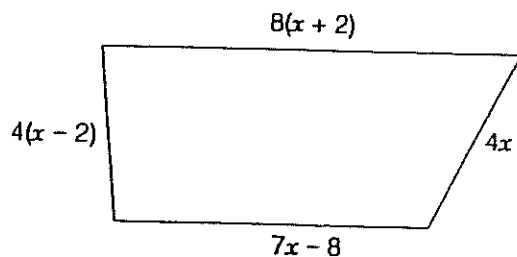
Show your work.

BEDMAS

$$8(x + 2) + 4x + 7x - 8 + 4(x - 2) = 460$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$P = a + b + c + d$$

$$4(x - 2) + 8(x + 2) + 7x - 8 + 4x$$

$$(4x - 8) + (8x + 16) + 7x - 8 + 4x$$

$$460 = 23x - 8 + 16 - 8$$

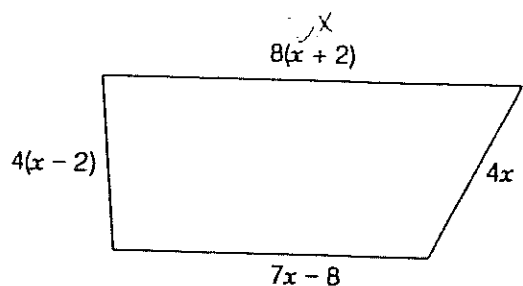
$$460 = 23x - 10$$

$$\frac{460}{13} = \frac{13x}{13}$$

$$x = 35.38 \text{ m}^2$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

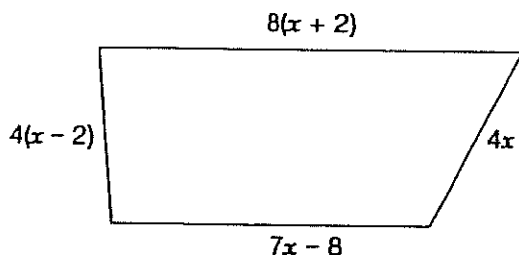
Show your work.

$$8x + 16 + 4x + 7x - 56 + 4x - 8$$

$$A = \frac{(a+b)h}{2}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

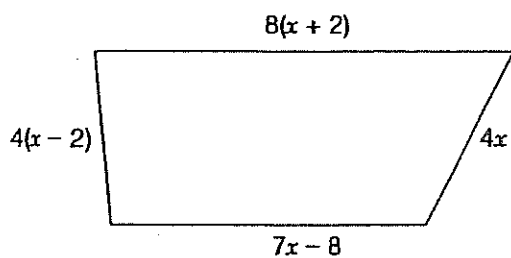
$$\begin{aligned}
 &= 8(105 + 2) &= 4(105) &= 7(105 - 8) &= 4(105 - 2) \\
 &= 8(107) &= 420 &= 7(97) &= 4(103) \\
 &= 856 &&= 679 &= 412
 \end{aligned}$$

$$\begin{array}{r}
 856 \\
 420 \\
 679 \\
 + 412 \\
 \hline
 2367 \text{ m}
 \end{array}$$

∴ You need 2,367 m of fencing

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$8(x + 2) = 48$$

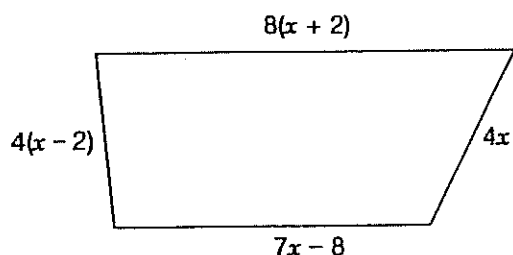
$$4x = 16$$

$$7x - 8 = 60$$

$$4(x - 2) = 14$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

First find the value of x .

$$4(x-2) + 8(x+2) + 7x-8 + 4x = 460$$

$$4x-8 + 8x+16 + 7x-8 + 4x = 460$$

$$4x+8x+7x+4x=460-8+16-8$$

$$23x = 460$$

$$x = \frac{460}{23}$$

$$x = 2$$

$$\begin{aligned} 8(x+2) \\ = 8(2+2) \\ = 32 \text{ m} \end{aligned}$$

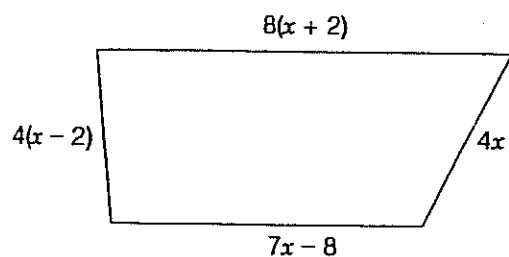
$$\begin{aligned} 4(x-2) \\ = 4(2-2) \\ = 4 \text{ m} \end{aligned}$$

$$\begin{aligned} 4x \\ = 4(2) \\ = 8 \text{ m} \end{aligned}$$

$$\begin{aligned} 7(x)-8 \\ = 7(2)-8 \\ = 14-8 \\ = 6 \text{ m} \end{aligned}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$8(x + 2) + 4(x - 2) + 7x - 8 + 4x$$

$$8x + 16 + 4x - 8 + 7x - 8 + 4x = 460$$

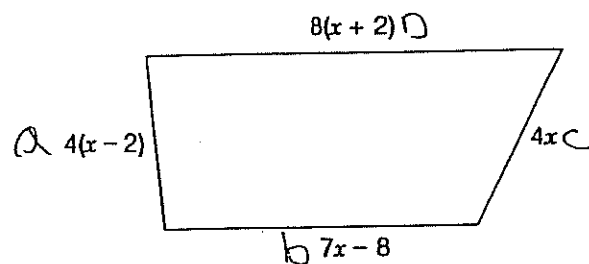
$$23x = 460$$

$$\begin{array}{r} 23 \overline{) 460} \\ \underline{46} \\ 0 \end{array}$$

$$x = 20$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



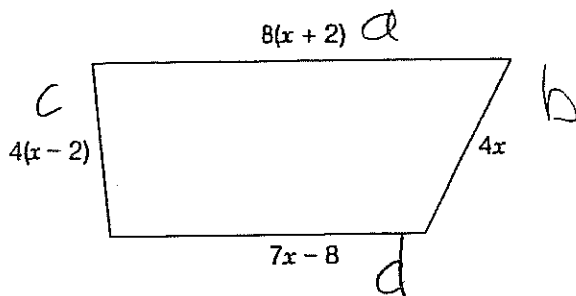
Determine the length of fencing needed for each side of the field.

Show your work.

$$\begin{aligned}
 A &= 4(x-2) \\
 &= 4(-12) \\
 &= -48
 \end{aligned}
 \qquad
 \begin{aligned}
 b &= 7x-8 \\
 &= -12
 \end{aligned}
 \qquad
 \begin{aligned}
 c &= 4x \\
 &= -48
 \end{aligned}
 \qquad
 \begin{aligned}
 d &= 8(x+2) \\
 &= 8(32) \\
 &= 256
 \end{aligned}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$P = a + b + c + d$$

$$460 = 8(x+2) + 4x + 4(x-2) + 7x-8$$

$$460 = 8x + 16 + 4x + 4x - 8 + 7x - 8$$

$$460 = 8x + 4x + 4x + 7x + 16 - 8 - 8$$

$$460 = 23x + 0$$

$$460 - 0 = 23x$$

$$\frac{460}{23} = \frac{23x}{23}$$

$$19.8 = x$$

$$a = 8(x+2)$$

$$= 8(19.8+2)$$

$$= 8(21.8)$$

$$= 174.4 \text{ m of fence is needed for side a.}$$

$$b = 4x$$

$$= 4(19.8)$$

$$= 79.2 \text{ m of fence is needed for side b}$$

$$c = 4(x-2)$$

$$= 4(19.8-2)$$

$$= 4(17.8)$$

$$= 71.2 \text{ m of fence is needed for side c}$$

$$d = 7x - 8$$

$$= 7(19.8) - 8$$

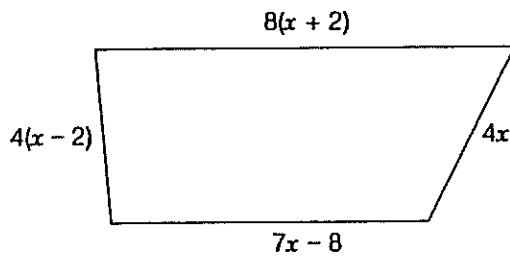
$$= 138.6 - 8$$

$$= 130.6 \text{ m of fence is needed for side d.}$$

in total you will need $174.4 + 79.2 + 71.2 + 130.6$
 $= 455.4 \text{ m of fence}$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



$$8x + 2 + 4x - 2 + 7x - 8 + 4x = 460$$

$$3x = 460 - 2 - 4 + 2 - 7 + 8 - 4$$

$$3x = 453$$

$$x = 151$$

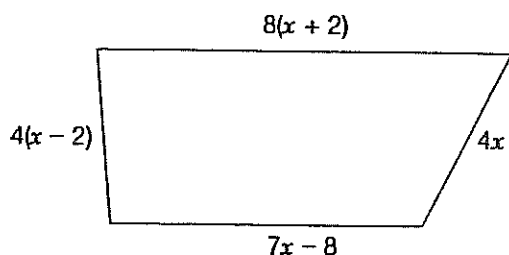
Determine the length of fencing needed for each side of the field.

Show your work.

151 fence is needed

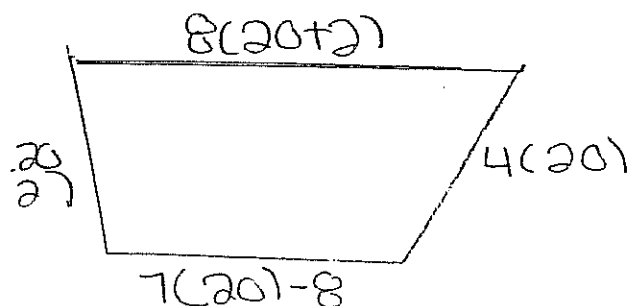
12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

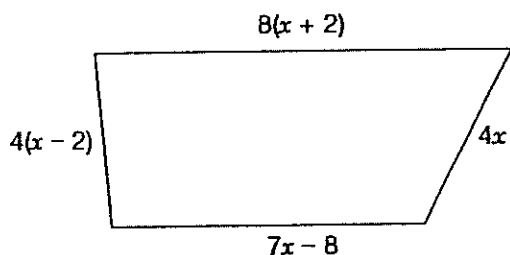
Show your work.



$$8(20 + 2) + 4(20) + 7(20) - 8 + 4(20 - 2) = 460 \text{ m.}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



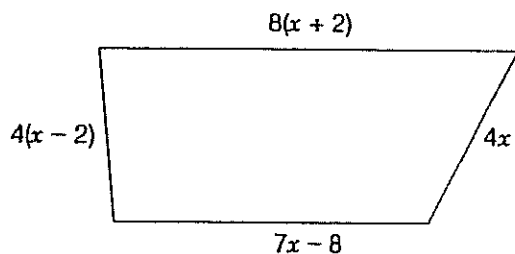
Determine the length of fencing needed for each side of the field.

Show your work.

$$\begin{aligned} &8(x + 2) + 4(x - 2) + 4x + 7x - 8 \\ &= 32x + 28x - 8 \\ &= 52x \end{aligned}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$4(x-2) + 8(x+2)$$

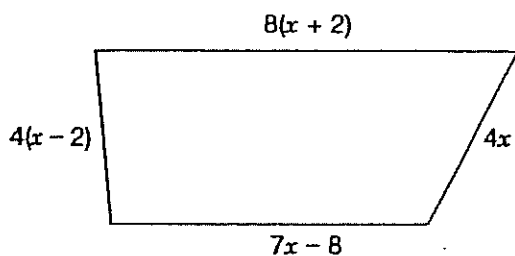
$$4x - 8 + 8x + 16$$

$$4x + 8x - 8 + 16$$

$$\begin{array}{r} 4x + 8 \\ 8x - 8 \\ \hline 12x - 2 \end{array}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



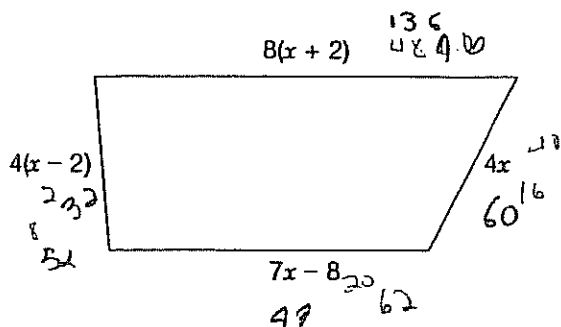
Determine the length of fencing needed for each side of the field.

Show your work.

$$\begin{aligned}
 P &= 8(x+2) + 4x + 7x - 8 + 4(x-2) \\
 &= 8x + 16 + 4x + 7x - 8 + 4x - 8 \\
 &= 8x + 4x + 7x + 4x \\
 &= 296x + 16 - 8 - 8 \\
 &= 296x
 \end{aligned}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$x = 20$$

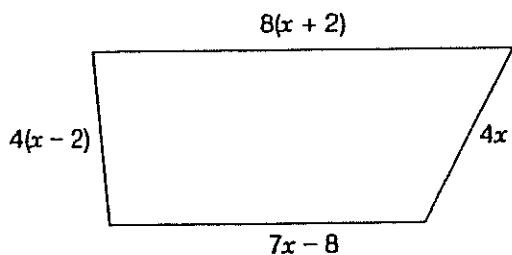
$$4(20-2) + 8(20+2) + 4 \times 20 + (7 \times 20 - 8)$$

$$72 + 176 + 80 + 132$$

$$A = 460 \text{ m}$$

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$460 = 8(x+2) + 4x + 4(x+2) + (7x+1)$$

$$460 = 8x+2 + 4x + 4x+2 + 7x+1$$

$$460 = \frac{9x+4x}{13} \quad \frac{8x+7x+1}{13}$$

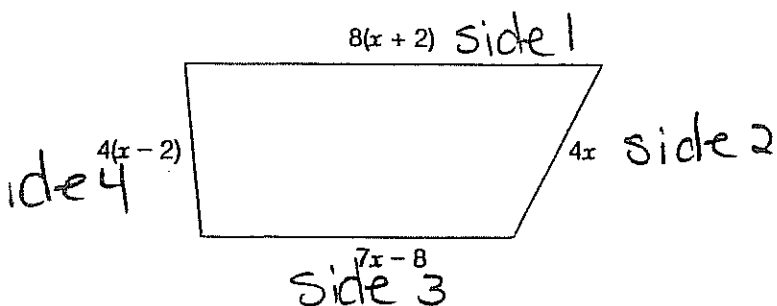
$$460 = 13x = 13x + 1$$

$$\begin{array}{r} 155 \\ 460 \\ \hline +3 \end{array} = \frac{13x}{13x}$$

155 Ans.

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$\begin{aligned} &\text{Side 1} + \text{Side 2} + \text{Side 3} + \text{Side 4} = 460 \\ &8(x+2) + 4x + 7x-8 + 4(x-2) \\ &= 8x+16 + 4x + 7x-8 + 4x-8 \\ &\text{add } S1+S2 \\ &\underline{8x+16+4x} \\ &12x+16 \end{aligned}$$

$$\begin{aligned} &\text{adding } S1+S2+S3 \\ &\underline{12x+16+7x-8} \\ &= 19x+16-8 \\ &= 19x+8 \end{aligned}$$

$$\begin{aligned} &\text{Adding } S1+S2+S3+S4 \\ &\underline{19x+8+4x-8} \\ &= 23x \\ &23x = 460 \\ &460 \div 23 = 20 \\ &x = 20 \end{aligned}$$

$$\begin{aligned} &\text{Side 1} \\ &8x+16 \\ &= 8+20+16 \\ &= 44 \end{aligned}$$

$$\begin{aligned} &\text{Side 2} \\ &4x \\ &= 4+20 \\ &= 24 \end{aligned}$$

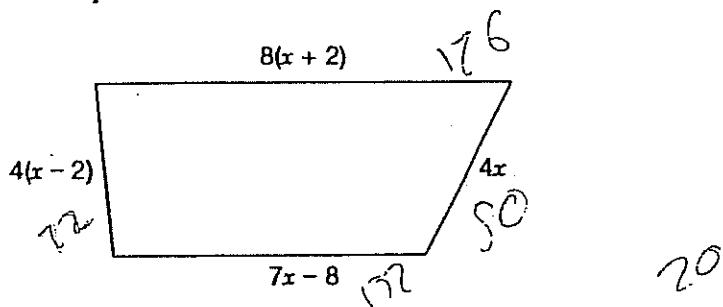
$$\begin{aligned} &\text{Side 3} \\ &7x-8 \\ &= 7+20-8 \\ &= 27-8 \\ &= 19 \end{aligned}$$

$$\begin{aligned} &\text{Side 4} \\ &4x-8 \\ &= 4+20-8 \\ &= 24-8 \\ &= 16 \end{aligned}$$

So side 1 is 44m
side 2 is 24m
side 3 is 19m
side 4 is 16m

12. Field Maintenance

A field in the shape of a trapezoid has a perimeter of 460 m. A fence is being built along the field's perimeter.



Determine the length of fencing needed for each side of the field.

Show your work.

$$8(20+2) = 176$$

$$4(20-2) = 72$$

$$7 \times 20 - 8 = 132$$

$$4 \times 20 = 80$$

$$176 + 72 + 132 + 80 = 460$$

The 4 sides are 176, 72, 132, 80.